

What is claimed is:

1. A semiconductor cleaning apparatus comprising:
 - a cleaning bath supplied with a cleaning solution composed of ammonium hydroxide, deionized water and ozone;
 - 5 a megasonic transducer for applying uniform megasonic power to the cleaning bath using water as a medium;
 - an ozone concentration analyzer for measuring the concentration of ozone in the cleaning solution;
 - 10 pH and Eh meters for measuring the pH and Eh of the cleaning solution;
 - an ammonium hydroxide addition injection port for additionally supplying ammonium hydroxide into the cleaning bath if the concentration of ammonium hydroxide in the cleaning solution decreases to less than a predetermined amount;
 - 15 a mixing tank for mixing ammonium hydroxide, deionized water and ozone in a predetermined volume ratio;
 - a first filter for removing ozone bubble components in the cleaning solution supplied from the mixing tank;
 - 20 a supply pipe for supplying the cleaning solution into the cleaning bath through the first filter;
 - an ammonium hydroxide tank for supplying ammonium hydroxide into the mixing tank;
 - 25 an ozone generator connected to the mixing tank and the cleaning bath, the ozone generator for supplying ozone into the mixing tank early on a cleaning process and supplying ozone into the cleaning bath after the supply of the cleaning solution into the cleaning bath is exhausted;
 - a circulation pump for circulating the cleaning solution in the cleaning bath through the;
 - 30 a chiller for lowering the temperature of the cleaning solution circulated through the circulation pipe to a low temperature;
 - a second filter for removing particle components of the cleaning solution supplied through the circulation pipe; and

a wastewater discharging pipe for discharging the almost exhausted cleaning solution.

2. The semiconductor cleaning apparatus of claim 1, wherein the chiller
5 stops driving if the cleaning process is performed at a room temperature and drives only if the cleaning process is performed at a low temperature.

3. A method of cleaning a wafer surface comprising:
forming a cleaning solution by adding ozone to aqueous ammonium hydroxide,
10 which is composed of ammonium hydroxide and deionized water in the volume ratio of 0.001 – 0.01:5;
supplying the cleaning solution into a cleaning bath through a filter for removing ozone bubble;
applying megasonic power to the cleaning solution in the cleaning bath using a megasonic transducer; and
15 dipping a wafer surface in the cleaning solution which is at a room temperature to remove contaminants on the wafer surface.

4. A method of cleaning a wafer surface comprising:
forming a cleaning solution by adding ozone to aqueous ammonium hydroxide,
20 which is composed of ammonium hydroxide and deionized water in the volume ratio of 0.001 – 0.01:5;
supplying the cleaning solution into a cleaning bath through a filter for removing ozone bubble;
circulating the cleaning solution in the cleaning bath through a circulation pipe and then supplying the cleaning solution into the cleaning bath again along the circulation pipe through a chiller;
25 applying megasonic power to the cleaning solution in the cleaning bath using a megasonic transducer; and

dipping a wafer surface in the cleaning solution which is at a low temperature of 10 - 15°C to remove contaminants on the wafer surface.